

International Population Movements as Aids to Communicable Disease Control

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POPULATION movements have always been viewed as a real or potential hazard in the spread of communicable disease. In the Crusades, the internecine conflicts of the Renaissance, and the conquests which brought the Americas into the orbit of European culture, disease was always one of the horsemen riding side by side with the soldier, the merchant, and the priest. The traveler's course might be traced by the implantation of disease as well as by the growing weeds whose seeds had dropped from his saddlebags.

It is only in recent years, and even then with little real appreciation of its inherent logic and potential strength, that public health workers have taken advantage of population movements and used them as a positive force for health by combining a few simple ingredients of border inspection, quarantine, treatment, and control epidemiology.

While several rudimentary examples of this approach in regard to mobile populations have emerged from the operation of the venereal disease control program of the United States, no example existed prior to 1956 in which use was made of an international population movement

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that would apply all of the basic elements of venereal disease control for the benefit of two countries.

It was therefore a program of new stature which the national health agencies of Mexico and the United States undertook in 1956 when they decided to weld together the elements of a complete international control program and apply it to Mexican migrant laborers coming into the United States during the growing and harvesting season.

It should be clearly understood that such synthesis cannot be affected at will. It is based on mutual respect and understanding between the two nations as well as upon a number of preconditions, including facility and speed in diagnosis and treatment, the existence of a contact-eliciting and contact-tracing mechanism, and the availability of forces which can be mobilized to accomplish diagnosis, treatment, and contact investigation. Even in 1956 when jet planes hurtled through the air at speeds far exceeding sound and the mysteries of orbital space had become the commonplace of newspaper headlines, these factors were not entirely adequate to cope with all aspects of the combined programs; they were present in sufficient degree, nevertheless, to merit the sizable demonstration test which we describe.

More than 400,000 Mexican agricultural workers enter the United States each year to work in our fields at the times when there is an urgent seasonal demand for labor. Physical examinations are given these workers by the Public Health Service Division of Foreign Quarantine, both at the recruitment centers in

Mexico and the reception centers on the American side of the border. These examinations serve to detect most of the clinically evident venereal disease. However, in the absence of a blood-testing program, syphilitic workers without clinical symptoms at the time of admission have gone undetected. Mexican and United States health workers have repeatedly explored means of using the opportunity presented by these population movements to develop a syphilis control program benefiting both countries.

Mass Blood Testing Begun

Because of difficulties of organization and finance, no substantial combined activities were undertaken until 1956, when it was informally

arranged between the two Federal health agencies that as many of the migrants as possible would be blood tested in Mexico and that the Public Health Service would assign syphilis control teams to at least some of the five reception centers through which Mexican agricultural workers pass to be processed and assigned to the growers who use their services.

The United States testing teams reported that an occasional worker volunteered evidence of a recent serologic test for syphilis. It was, however, impossible for these teams, handling a high volume of workers with whom they had communication difficulties, to determine how many had been blood tested in Mexico. It is the activities of the United States teams that we report in the following paragraphs.

Table 1. Mexican border testing program, 1956: number tested and number and percent reactive, by Mexican state of origin

Mexican state	El Centro			El Paso			Total		
	Number tested	Number reactive	Percent reactive	Number tested	Number reactive	Percent reactive	Number tested	Number reactive	Percent reactive
Aguascalientes	247	9	3.6	146	14	9.6	393	23	5.9
Baja California	1,516	198	13.1	1	0	0	1,517	198	13.1
Baja California Sur (territory)	1	0	0	0	0	0	1	0	0
Campeche	0	0	0	0	0	0	0	0	0
Chiapas	4	0	0	0	0	0	4	0	0
Chihuahua	20	1	5.0	22,502	1,464	6.5	22,522	1,465	6.5
Coahuila	17	4	23.5	1,606	213	13.3	1,623	217	13.4
Colima	408	37	9.1	5	0	0	413	37	9.0
Distrito Federal	599	87	14.5	222	30	13.5	821	117	14.3
Durango	3,162	256	8.1	10,619	845	8.0	13,781	1,101	8.0
Guanajuato	12,635	843	6.7	825	38	4.6	13,460	881	6.5
Guerrero	3,968	752	19.0	408	52	12.7	4,376	804	18.4
Hidalgo	241	20	8.3	51	3	5.9	292	23	7.9
Jalisco	13,469	1,369	10.2	4,225	423	10.0	17,694	1,792	10.1
Mexico	2,161	140	6.5	1,364	65	4.8	3,525	205	5.8
Michoacan	10,605	763	7.2	913	49	5.4	11,518	812	7.0
Morelos	652	68	10.4	126	13	10.3	778	81	10.4
Nayarit	517	69	13.3	2	0	0	519	69	13.3
Nuevo Leon	3	0	0	8	1	12.5	11	1	9.1
Oaxaca	3,557	266	7.5	466	32	6.9	4,023	298	7.4
Puebla	1,168	61	5.2	527	25	4.7	1,695	86	5.1
Queretaro	171	14	8.2	402	19	4.7	573	33	5.8
Quintana Roo	0	0	0	0	0	0	0	0	0
San Luis Potosi	816	44	5.4	61	1	1.6	877	45	5.1
Sinaloa	409	28	6.8	0	0	0	409	28	6.8
Sonora	273	29	10.6	1	0	0	274	29	10.6
Tabasco	190	24	12.6	2	0	0	192	24	12.5
Tamaulipas	18	4	22.2	29	5	17.2	47	9	19.1
Tlaxcala	321	20	6.2	278	26	9.4	599	46	7.7
Veracruz	179	14	7.8	57	7	12.3	236	21	8.9
Yucatan	129	13	10.1	8	0	0	137	13	9.5
Zacatecas	5,637	304	5.4	6,968	419	6.0	12,605	723	5.7
Unknown	546	54	9.9	45	5	11.1	591	59	10.0
Total	63,639	5,491	8.6	51,867	3,749	7.2	115,506	9,240	8.0

Pursuant to our agreement, and in cooperation with the U. S. Department of Labor, two of the reception centers—El Paso, Tex., and El Centro, Calif.—were chosen for the assignment of such teams over the period August 16 to October 12, 1956. This period covers the great fall harvesting season when the migrant movement swells to a peak. During that period 115,506 Mexican workers were blood tested; 9,240 were found reactive to a serologic test for syphilis; 7,098 were given treatment in the United States; 1,532 notifications were sent to Mexican health departments on workers not found prior to their return to Mexico; and 7,004 marital contact reports on the wives of workers with a positive test for syphilis were sent to Mexican health departments. All in all, then, the control aspect of this program concerned itself with 16,244 syphilis suspects, comprising the 9,240 men who were positive reactors and the 7,004 women who were married to positive reactors.

Who were these people, and what happened to them? Table 1 and the chart show the distribution of the male workers and states from which they came. Almost 80 percent of all the migrants tested at El Centro and El Paso came from the six states of Chihuahua, Durango, Guanajuato, Jalisco, Michoacan, and Zacatecas, but the rate of positivity for this group was somewhat lower than average. Certain other areas with a lesser flow of migrants, such as Baja California (Norte), Distrito Federal, Guerrero, and Nayarit, contributed markedly higher than average rates of positivity. Although these states vary widely in the known prevalence of pinta, no attempt was made to evaluate the role which each of these diseases played in the total numbers of serologically positive tests.

Marquez, Rein, and Arias, in reporting findings of the study of pinta in Mexico carried out by the Mexican Ministry of Health during 1929-31, indicate that those states affected were Guerrero, Oaxaca, Mexico, Chiapas, Michoacan, Puebla, Tabasco, Morelos, Nayarit, Veracruz, and the highest prevalence was found in Guerrero where approximately 20 percent of the population is affected.

The Mexican Ministry of Health had requested us to prepare the tabulations given in table 1 since this would give them a helpful

cross section analysis of treponematosi in the areas from which migration came. The data do not, of course, reflect internal variations within the states concerned but, since the majority of the contract workers were rural and since the migratory populations have other identifying characteristics, the information contained in the table should be of considerable use to control programs in the areas concerned. The table provides a current index to the extent of the problem among the group tested.

But, however important it may be to define the extent of a problem, it is much more important to do something about it. Herein lay a great difficulty. We knew that the stay of the Mexican workers in the reception centers was usually for only a few hours. It was something of a problem even to collect a blood speci-

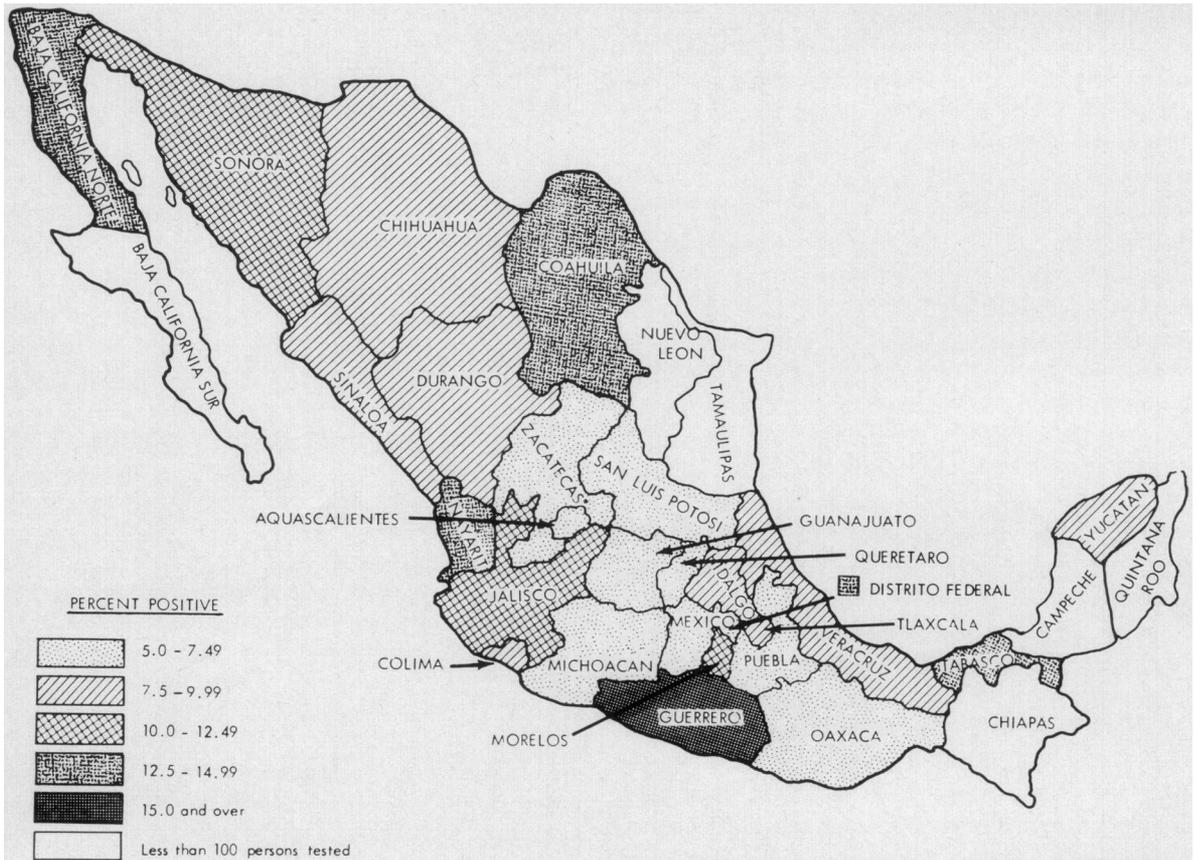
Table 2. Disposition of 9,240 Mexican agricultural workers with positive serologic tests for syphilis, by State to which cases were referred

State	Number of workers referred	Treated for syphilis		Not located
		Number	Percent	
Arizona.....	38	10	26.3	28
California.....	5,468	4,215	77.1	1,253
Colorado.....	30	30	100.0	0
Kansas.....	6	6	100.0	0
New Mexico.....	899	780	86.6	96
Texas.....	2,325	2,057	88.5	268
Not referred to a State ¹	474	0	0	474
Total.....	9,240	7,098	76.8	2,119

¹ Of those not located or not referred to a State, 1,532 were reported to the Mexican Ministry of Health for action upon their repatriation. The remainder were not reported to Mexico for lack of complete address.

men on all comers during those few hours because the centers were set up to process as many as 4,000 men per day, and our teams experienced a number of days when the flow was well over 3,000. Even writing a laboratory report form on each man was out of the question, especially since most of our team members did not speak Spanish. So we decided to microfilm the workers' Labor Department identification forms, an important factor in the control operation because it also contained the name, re-

Percentage of positive reactors to serologic tests for syphilis among 115,506 Mexican contract laborers, by state of residence in Mexico, 1956.



lationship, and address of his nearest-of-kin, usually his wife.

On this Labor Department form we stamped the number of the worker's blood tube. Then, after the name and address of the grower to whom he had been assigned was entered on the form, we microfilmed the entire document. We therefore had in our possession on one document a complete record of where we could locate both the man and his wife—a document obtained at a cost of seconds per person tested.

Case Finding Expedited

We knew that finding these workers after they had left the reception centers would not be easy. Back in 1951 we had experienced bitter failure in our first attempt to do this. In that year we tested some 11,000 Mexican braceros, sent their blood specimens to the Public Health Service Venereal Disease Research Laboratory

in Atlanta, and the positive reports to the State health department concerned. Because of the time lapse involved, most of the persons with positive blood were never found: they had moved from the farm of their original assignment.

This time we were prepared to deal more expeditiously with the laboratory phase of the program. With the active and energetic cooperation of the State health department laboratories of Arizona and Texas, serologic reports reached the reception center within 24 hours after blood specimens were taken. Blood was flown from the center to the laboratory in the afternoon, analyzed the following morning, and reports returned to the center on the same day. Suspect reports prepared by the center on all individuals with a seropositive test for syphilis might therefore reach the destination of the bracero very shortly after his arrival on the farm of his first work assignment.

In the States of the Pacific Coast we had a strong case-finding ally in the Continental Casualty Company, the insurance firm which provides medical care for braceros on the west coast. They voluntarily proposed that their officials in California arrange, with the aid of the growers' association and farmers, to locate each serologically positive Mexican worker and bring him in to the office of their local physician for diagnosis and treatment. We accepted this offer with great alacrity, although we assured the company that their task would not be an easy one.

Nor was it accomplished without some substantial difficulties. Some few growers' associations at the peak of their seasonal work were at first apathetic or even hostile. Some physi-

cians found themselves so burdened with the other medical problems of braceros that they could not give effective service to the syphilis suspects, so that the Public Health Service had to send in help. But the great bulk of seropositive men were finally found and treated.

In the other States—chiefly Texas, New Mexico, and Arizona—case finding was done by regularly employed investigators working in the State venereal disease program. They were focused on the areas receiving braceros for the period of need. In New Mexico and Arizona, public clinics provided diagnosis and treatment. In Texas, medical service was obtained in large part by contract with private physicians.

Seventy-seven percent of the serologic re-

Table 3. Disposition of 7,004 marital contacts of seropositive Mexican workers reported for investigation in Mexico

State	Number referrals sent	Number returned	Brought to treatment	Returned to treatment	Al-ready under treatment	Ade-quate treatment	Located but un-cooperative	Not in-fected	Can-not locate	Insuf-ficient infor-mation	Moved	Other
Aguascalientes	16	7	1	0	0	0	0	5	0	1	0	0
Baja California	155	104	5	0	0	1	20	26	28	19	5	0
Baja California Sur (territory)	2	2	0	0	0	0	0	0	0	0	2	0
Campeche	0	0	0	0	0	0	0	0	0	0	0	0
Chiapas	0	0	0	0	0	0	0	0	0	0	0	0
Chihuahua	996	53	6	0	0	3	1	23	20	0	0	0
Coahuila	149	20	1	0	0	1	1	7	0	0	10	0
Colima	25	20	3	0	2	0	0	14	0	0	0	1
Distrito Federal	82	0	0	0	0	0	0	0	0	0	0	0
Durango	804	0	0	0	0	0	0	0	0	0	0	0
Guanajuato	754	115	8	0	0	0	3	68	28	0	4	4
Guerrero	583	0	0	0	0	0	0	0	0	0	0	0
Hidalgo	17	15	0	0	0	0	0	0	6	4	5	0
Jalisco	1,400	0	0	0	0	0	0	0	0	0	0	0
Mexico	151	49	7	0	2	1	0	17	16	5	1	0
Michoacan	671	42	1	2	1	0	6	32	0	0	0	0
Morelos	48	10	10	0	0	0	0	1	2	0	0	0
Nayarit	49	5	2	0	0	0	0	1	2	0	0	0
Nuevo Leon	0	0	0	0	0	0	0	0	0	0	0	0
Oaxaca	212	0	0	0	0	0	0	0	0	0	0	0
Puebla	67	0	0	0	0	0	0	0	0	0	0	0
Queretaro	14	7	1	0	0	0	0	6	0	0	0	0
Quintana Roo	0	0	0	0	0	0	0	0	0	0	0	0
San Luis Potosi	39	0	0	0	0	0	0	0	0	0	0	0
Sinaloa	12	9	0	0	0	0	1	5	2	0	1	0
Sonora	26	8	0	0	0	0	0	0	8	0	0	0
Tabasco	18	0	0	0	0	0	0	0	0	0	0	0
Tamaulipas	9	1	0	0	0	0	0	0	1	0	0	0
Tlaxcala	33	0	0	0	0	0	0	0	0	0	0	0
Veracruz	10	1	0	0	0	0	0	1	0	0	0	0
Yucatan	7	6	0	0	0	0	1	5	0	0	0	0
Zacatecas	600	0	0	0	0	0	0	0	0	0	0	0
Unknown	55	0	0	0	0	0	0	0	0	0	0	0
Total	7,004	474	45	2	5	6	33	210	111	29	28	5

actors were treated (table 2). Of the 2,119 not located, suspect report forms were sent on 1,532, after the crop season was over. Information on the suspect was transmitted on the recently instituted multilingual form developed by the Pan American Sanitary Bureau and now available for use by all nations of the Americas in the international reporting of venereal disease contacts and suspects. This form, sent to the Mexican state health department of jurisdiction, advised in Spanish that the person named had been tested in the United States, that the result of this test was positive, and that he had returned to Mexico before diagnosis could be made and treatment instituted.

This completed our work on the 9,240 braceros whose blood tests were positive. Its overall efficiency was 77 percent, even without accounting for the men who might subsequently have been located in Mexico. This is a pretty fair degree of case-finding efficiency for any group of syphilis suspects, but is phenomenal in relation to so highly mobile a foreign language group.

As has been indicated earlier, we reported to Mexico a total of 7,004 women who were marital partners of braceros with a positive test for syphilis. The reports on these wives were also sent on the Pan American Sanitary Bureau form. Each of these, too, carried an individual communication in Spanish advising the recipient health department that the person named in the form was a familial contact of a serologically positive Mexican worker currently in the United States. It further requested that the Public Health Service be notified as to the results of investigation.

Relatively few replies were received indicating what action had been taken (table 3). This is not particularly surprising. In the first place, our experience in the United States indicates that there is a curious reluctance on the part of several State health departments to report a disposition on a contact report received from out of State. Since reporting to another country involves the mental bridging of an even larger gap, we can readily appreciate how much good case finding may have been accomplished through the use of these forms without our obtaining disposition reports.

We were also aware that a number of the addresses of wives which we used were incorrect

Table 4. Costs of blood testing, followup and treatment, and contact investigation of 115,506 Mexican agricultural laborers and their marital contacts

Activity	Total	Unit cost	
		El Paso	El Centro
Blood testing ¹	\$0. 564	\$0. 597	\$0. 537
Personnel .....	. 241	. 268	. 220
Salaries .....	. 147	. 168	. 130
Travel .....	. 018	. 017	. 019
Per diem .....	. 076	. 084	. 070
Laboratory .....	. 223	. 231	. 215
Other .....	. 099	. 098	. 102
Followup and treatment ^{2,3}	3. 393	6. 243	1. 442
Salaries .....			. 516
Travel .....			. 120
Per diem .....			. 232
Drugs .....			. 574
Contact investigation:			
Per report sent .....	. 194		
Per report returned	2. 865		
Per case brought to treatment	23. 414		

¹ Per person tested.

² Per person treated.

³ Itemization of followup and treatment costs not available for El Paso.

or insufficient. Even though these addresses may be of great importance to the workers in the case of illness or death; poor communications, poor understanding, and possibly other factors work against their accuracy.

Finally, the Pan American Sanitary Bureau form and the contact investigation procedure is relatively new to many Mexican health departments, particularly those of the rural areas from which most of the braceros come.

In spite of the low rate of return on disposition, it is of interest that almost a fifth of the cases reported as having been examined were brought or returned to treatment, indicating the relatively rich epidemiological vein which this reporting method makes available. If 17.5 percent of all the wife suspects were in need of treatment, the information contained in the 7,004 suspect reports might have led to the treatment of some 1,250 women with syphilis in Mexico.

Many desirable public health programs are relatively or absolutely impractical because of

their cost. Venereal disease control programs in the United States, as one aspect of their effectiveness, have always been mounted on the firm base of economical operation. This program was no exception, as can be seen from table 4. Total cost of blood testing was held to less than 60 cents per person, followup and treatment to an average cost of \$3.39 per person, and the unit cost per suspect to 19 cents per report sent.

Conclusions

This program demonstrates several novel combinations: the utilization of a quarantine procedure as a basis for a full-scale venereal disease case-finding, treatment, and contact investigation program, as well as for depiction of the geographic distribution of another country's problem; the practical elimination of distance in laboratory functioning; the use of microfilm as a technique for venereal disease control; and the backing of an insurance company in health control operations.

Attention to operational novelties, however, emphasizes process over concept: the concept that the quarantine procedure shares with other testing devices the powerful potential of a case-finding tool.

Quarantine will continue to maintain the devices which protect against the hazards of disease importation. But it also may become—possibly for chronic as well as communicable disease—one of the screening devices which in the future will share with other health services the responsibility and the reward for alerting the individual and the community—the community of nations included—to the presence of disease and the needs and methods for its control.

REFERENCE

- (1) Marquez, F., Rein, C. R., and Arias, O.: Mal del pinto in Mexico. *Bull. World Health Org.* 13: 299-322 (1955).

NIH Board of Scientific Counselors

A panel of six non-Federal scientists has been selected to comprise the Board of Scientific Counselors, established in February 1958 by the Public Health Service to review, discuss, and make recommendations on research in laboratories of the National Institute of Neurological Diseases and Blindness. The board held its first meeting in Bethesda, Md., February 20 and 21, 1958.

Chairman of the board is Dr. Hallowell Davis, director of research at the Central Institute of the Deaf, St. Louis. He will serve 4 years.

Appointed for 3-year terms are Dr. Howard J. Curtis, chairman, biological division, Brookhaven Laboratory, Upton, N. Y., and Dr. A. Earl Walker, professor of neurosurgery, the Johns Hopkins University.

The 2-year term members are Dr. Raymond Adams, chief of neurological services, Massachusetts General Hospital, Boston; Dr. Algeron B. Reese, clinical professor of ophthalmology, Columbia University College of Physicians and Surgeons; and Dr. Roger J. Rossiter, head of the department of biochemistry, University of Western Ontario, London, Canada.



This is the Way We Brush—

Toothbrushes were given 70 students in the small, 4-room school in Espilola, near Babol, Iran, with instruction in oral hygiene. The school, completed last year with point 4 assistance and staffed by two young, enthusiastic teachers, is the first program demonstration of school health in the Caspian region.

The children have been weighed and measured and tested for hearing and vision. The doctor of the Babol Health Center gave them physical examinations. We hope to make arrangements with private physicians and the Ministry of Health Hospital in Babol to correct the children's serious physical defects. The sanitation division is setting up hand-washing facilities at the school.

—GLEN W. McDONALD, M.D., M.P.H., *chief, Public Health Division, U. S. Operations Mission, Iran.*

Bandit Attack

Ethiopian bandits attacked one of our drilling supervisors, Robert House, between Jigjiga and Dik. Shot in the back and twice in the face, he miraculously escaped death. He was evacuated from Jigjiga to Addis Ababa, to Asmara, Eritrea, to Bahrein in the Persian Gulf, to Germany, and finally to the United States, where he is recovering.

—A. C. CURTIS, M.D., *chief, Health and Sanitation Division, U. S. Operations Mission, Ethiopia.*

Wan Phra Is Cleanup Day

Every "wan phra" is cleanup day in Panasnikom, Thailand. On the Buddhist weekly sabbath, the people clean their houses, the space underneath them, and their yards. The health committee roused interest in sanitation, and the resulting cleanup drive left the village spotless. Flowers and vegetables are planted in areas previously overgrown with weeds or cluttered with refuse.

Once Panasnikom's only source of drinking water during the dry season was a hole in the ground. The people walked down to the hole on rude planks and scooped up the muddy water at the bottom. Now they are building a water catch basin with shallow wells at two corners. International Cooperation Administration supplied pumps for the wells, which will be a year-round source of protected water.

The villagers themselves dug the wells and the catch basin, built the form for the well casings, and poured the casings and the slab. Sanitarians from Cholburi training center helped install the casings, slab, and pump.

—ROBERT L. ZOBEL, M.D., *chief, Public Health Division, U. S. Operations Mission, Thailand.*

Journey to Tobar Donoso

Anti-yaws campaign workers traveled for 8 days to reach the remote gold mining section of Tobar Donoso in northern Ecuador. Starting from the Colombian city of Tumace, they journeyed by railroad, boat, and pack animal into the Andes. All yaws cases and contacts in the isolated area were treated.

—JAMES D. CALDWELL, *chief, health, welfare and housing field party, U. S. Operations Mission, Ecuador.*

A Hut for the Zo

As a consequence of our classes in midwifery, the paramount chief in the small Liberian village we visited had built a hut where his wife, the head Zo, performs deliveries. In this and other villages the Gbarnga rural health unit holds classes for 135 midwives, or Zos. The classes concentrate on cleanliness, care of the umbilical cord, and recognition of abnormalities requiring medical attention.

In Sanniquellie we had a chance to compare our classes for midwives with the somewhat different system used by the hospital superintendent, a Liberian nurse who is English-trained. These Zos leave their families and villages and come to the Sanniquellie hospital for 14 or 15 months of experience. Except for housing, the midwives provide for all their own needs.

—JULIA WORTHINGTON, *adviser, Public Health Nursing, U. S. Operations Mission, Liberia.*